

## PATENT

What is claimed is:

- 1           1. A magnetic pickup for a stringed musical instrument, comprising:  
2                 magnet means for supplying a magnetic field which envelopes strings of a  
3                 musical instrument;  
4                 an upper coil means for sensing fluctuations in a magnetic field caused  
5                 primarily by said magnet means and generating an electrical string signal therefrom;  
6                 a lower coil means for sensing fluctuations in a primarily ambient magnetic  
7                 field caused by unwanted noise and for generating an electrical noise signal  
8                 therefrom;  
9                 connection means for coupling said lower coil means and said upper coil  
10                means together so said string signal and said noise signal are summed but are 180  
11                degrees out of phase;  
12                flux transfer means for diverting said magnetic flux lines in an ambient  
13                magnetic field not caused by said magnet means away from said said upper coil  
14                means and into said lower coil means so as to cause electrical signals representing  
15                noise to be mostly in said electrical noise signal generated by said lower coil means,  
16                and for helping concentrate magnetic flux lines from said magnetic field caused by  
17                said magnet means so as to cause most of a conversion of magnetic field flux line  
18                fluctuation caused by vibration of said strings to electrical signal to occur in said  
19                upper coil means.
- 1           2. The apparatus of claim 1 further comprising a trim pot adjustable resistor means  
2               coupled to said lower coil means for allowing adjustment of the amount of cancellation of  
3               noise signal in said electrical string signal via summation with an adjustable amount of said  
4               electrical noise signal.
- 1           3. A magnetic pickup for a stringed musical instrument having a plurality of strings,  
2               comprising:  
3                 an upper coil form having an upper coil winding wrapped around said upper  
4                 coil form to form an upper coil, said upper coil preferably having the same geometry  
5                 as prior art single coil magnetic pickups;  
6                 one or more magnets in the center of said upper coil form;

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7 a lower coil form having a lower coil winding wrapped around said lower coil  
8 form;

9 flux transfer plate means for concentrating in the vicinity of said upper coil the  
10 magnetic flux generated by said one or more magnets in the center of said upper coil  
11 form, and fluctuating in accordance with vibrations of magnetically permeable strings  
12 of a stringed instrument, and for diverting ambient magnetic flux lines which are  
13 fluctuating in accordance with unwanted noise away from said upper coil and into  
14 said lower coil;

15 connection means for coupling said upper coil to said lower coil such that an  
16 output signal is generated which is the difference between an electrical signal  
17 generated in said upper coil and a signal generated in said lower coil.

1 4. The apparatus of claim 3 further comprising adjustable resistor means coupled to  
2 said lower coil, for adjusting the amount of noise signal generated by said lower coil that is  
3 applied to cancel unwanted noise in a signal generated in said upper coil.

1 5. The apparatus of claim 3 wherein said one or more magnets comprises a plurality  
2 of alnico rod magnets.

1 6. The apparatus of claim 3 wherein said one or more magnets comprise a plurality of  
2 rare earth magnets.  
3

1 7. The apparatus of claim 6 wherein each of said rare earth magnets has a ferrous  
2 cap.  
3

1 8. The apparatus of claim 3 wherein said one or more magnets is a ceramic bar  
2 magnet.  
3

1 9. The apparatus of claim 8 further comprising a plurality of ferrous caps placed  
2 between a top of said bar magnet and said strings.

1 10. The apparatus of claim 3 wherein said flux transfer plate means is comprised of  
2 first and second ferrous plates formed so as to have vertical walls which shield the sides of

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3 said upper coil winding, and horizontal walls magnetically coupled to said vertical walls  
4 which shield said upper coil winding from said said lower coil winding, and a second set of  
5 vertical walls magnetically coupled to said horizontal walls which guide magnetic flux into a  
6 core of said lower coil winding, and wherein vertical means orthogonal to a plane defined by  
7 said strings and horizontal means parallel to a plane defined by said strings.

1 11. The apparatus of claim 3 wherein said lower coil form and said flux transfer plate  
2 means are a single structure molded or fabricated using ferrous material.

1 12. The apparatus of claim 11 wherein said ferrous material is ferrite.

1 13. The apparatus of claim 11 wherein said ferrous material is powdered metal.

1 14. The apparatus of claim 11 wherein said ferrous material is ferrous flakes  
2 encapsulated in a plastic matrix.

1 15. The apparatus of claim 11 wherein said ferrous material is any ferrous material  
2 which has been laminated.

1 16. A magnetic pickup for a stringed musical instrument, comprising:  
2 an upper coil form comprised of first and second plates formed of non ferrous  
3 material, each having a plurality of holes therein in which rod magnets may be  
4 inserted, said holes aligned so as to hold said rod magnets in parallel relationship  
5 when said upper coil form is assembled;  
6 an upper coil of electrical conductor wrapped around said upper coil form;  
7 a plurality of rod magnets inserted in the holes in said first and second plates  
8 of said upper coil form so as to be surrounded by windings of said upper coil;  
9 a lower coil form made of any ferrous or non ferrous, rigid material that can  
10 serve as a bobbin around which a coil of wire can be wrapped and having a slot  
11 therein;  
12 a lower coil winding of electrical conductor wrapped around said lower coil  
13 form;  
14 a ferrous material slug inserted in said slot;

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15                flux transfer plates for concentrating in the vicinity of said upper coil the  
16                magnetic flux generated by said one or more magnets in the vicinity of said upper coil  
17                and for diverting ambient magnetic flux lines which are fluctuating in accordance with  
18                unwanted noise away from said upper coil and into said lower coil;  
19                a printed circuit board for coupling said upper coil to said lower coil such that  
20                an output signal is generated which is the difference between an electrical signal  
21                generated in said upper coil and a signal generated in said lower coil.

1                17. A two-coil pickup for a stringed instrument having an upper coil arranged so as  
2                to be closest to strings of said stringed instrument and having a lower coil below said upper  
3                coil which is coupled so that signals generated in said upper and lower coils are summed but  
4                such that any signal generated in said lower coil is 180 degrees out of phase with any signal  
5                generated in said upper coil, and characterized by said upper coil having the same or very  
6                similar geometry to prior art single coil pickups and a ferrous flux transfer plate which shields  
7                said upper coil from magnetic flux variations caused by undesired noise and diverts magnetic  
8                field flux variations caused by undesired noise away from said upper coil into the lower coil  
9                so as to maximize the amount of noise signal generated in the lower coil and minimize the  
10               amount of noise signal picked up by the upper coil.

1                18. A process carried out in a two-coil pickup for a stringed instrument having an  
2                upper coil located near strings of said instrument and a lower coil situated further away from  
3                said strings than said upper coil, comprising the steps:  
4                               shielding said upper coil from ambient magnetic field fluctuations not caused  
5                               by vibrations of said strings, and diverting said ambient magnetic field fluctuations so  
6                               as to be concentrated in the vicinity of said lower coil;  
7                               concentrating magnetic field fluctuations caused by vibrations of said strings  
8                               (string flux) in said upper coil and shielding said lower coil from said string flux; and  
9                               subtracting the signal generated in said lower coil from the signal generated in  
10               said upper coil.